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ABSTRACT

This study focused on administrator perceptions of technology issues in higher education and the effects of technology on their work. This analysis is based on a study that used an instrument developed for the study with 34 questions with open-ended response items. The survey was sent to a stratified random sample of community college administrators across 14 position codes, and 910 usable surveys were received (54% response rate). The study aimed to report trends and patterns in the data. Thus the data reported is mainly descriptive. Administrators described an increasing number of conferences, workshops, and professional development workshops on the incorporation of technology, but the most pressing issues and challenges were not always clear. What responses did make apparent is that the rapid changes as a result of technology demand more systematic approaches to faculty development, staff training, and technological compatibility and upgrades, as well as student support services. Data show many different administrative perspectives, making clear the need for additional research. (Contains 2 tables and 36 references.) (SLD)

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The Use of Technology: Administrator Perceptions of Institutional Issues

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The Use of Technology: Administrator Perceptions of Institutional Issues

Introduction

As postsecondary institutions jump on the technological bandwagon, community colleges are often heralded for being at the forefront of instructional and administrative innovation (O'Banion, 1997, 1999). In 1998, for example, 62% of all two year public institutions offered distance education in some form, with another 18% expecting to do so by 2001 (Hancock, 2001). Given their historical reputation as adaptive, responsive, and flexible educational institutions (Cohen & Brawer, 1996; Levin, 2001), community colleges are well suited to embrace technology and the accompanying changes.

Community colleges educate a diverse student clientele and have adapted and adopted multiple pedagogical strategies. Thus, it would not be surprising to find community colleges gravitating quickly towards the use of on-line and distance education as a means of serving the adult learner for whom such instructional practices are a perceived panacea. As early as 1993, Doucette noted, "technology-supported distance learning programs are key applications in which community colleges are leading higher education" (p. 24). He goes on to state that, "community colleges exemplify the fundamental elements of the transformation of the teaching and learning process: movement out of the classroom and replacement of the teacher with the independent adult learner at the center of the teaching and learning process" (p. 24). This type of learning, accessed any time and any place is a hallmark of O'Banion's (1997) learning college principles, providing access to occupational and vocational education as well as academic transfer and lifelong learning opportunities for the non-traditional learner.

Similarly, in an institution stereotyped as structurally adaptive, one might expect to find significant technology usage throughout the college as a means of continually changing to address student and client needs.

A 1997 study of information technology in higher education reported that the persistent challenges confronting institutions were assisting faculty to integrate information technology into instruction, providing adequate user support, and financial planning for technology (Green, 1997). Aside from national studies covering the spectrum of postsecondary education such as this, much of the literature on technology in community colleges is marked by case studies of innovative best practices related to technology in the classroom and institutional strategies for implementing technological change (see for example, Anandam, 1998). These studies provide useful information, but do not provide insight into how administrators as key decision makers are experiencing and interpreting technological changes on campus.

Darrell Hull (1999) recommends that community colleges would benefit "from taking a step back and evaluating the intent of technology being implemented and how it serves their mission and intent to deliver education" (p. 38), and, we would add, how it impacts administrative work. In addition to the more common teaching and learning questions around which much of the technology discussions circulate, we propose that there are administratively-oriented questions that need to be part of the evaluation Hull suggests. Such an evaluation might be guided by such questions as: What are the infrastructure issues in supporting such innovation, including technical support, professional development for faculty and administrators, and hardware and software needs? How is technology integrated into the planning processes of institutions? How do

the priorities, goals, and actions related to technology align with the mission, priorities and goals of the institution? The questions are abundant and answers that can be generalized across institutions are slow to surface, in part because of the extent to which individual campuses and even individual programs are engaged in the debate around issues of technology.

Technology has far reaching implications beyond those directly affecting student learning. According to Levin (2001), technologies and their accompanying behaviors are evident not only in instruction, but also in administrative work. He clarifies that there are two parts to the presence of technology in higher education: the first part is outcomes of using technology, especially in instruction; the second part is current behaviors and effective use of technology, particularly in administrative work. This article focuses on administrator perceptions of technology issues and the effects of technology on their work.

The Study

We begin with identifying administrator perceptions of key technology issues facing community college campuses today, based on data from a national survey of community college administrators (Amey, VanDerLinden, & Brown, 2002)[1]. Because the administrators surveyed were collectively responsible for all functional areas of the colleges they represented, the issues they identify cut across multiple areas of administrative oversight and work, including teaching and learning, infrastructure,

[1] The study was originally supported with funding from the Center for the Study of Advanced Learning Systems and the Office of University Outreach, University Provost's Office, Michigan State University.

mission attainment, organizational growth, and outreach. The main research questions guiding this study related to administrator perspectives on:

1) To what extent have technology and technology issues become part of the driving mission of the community college currently and as it looks to the future?
2) What issues related to technology are most important to administrators and their institutions?

We place the findings from our study into the broader research and scholarly context of technology use in postsecondary education to show specific examples of forecasted trends and issues. Our intent is to raise policy and practice concerns that emerge from more closely examining administrator perceptions in technology use and its consequences.

Our instrument used in the original study from which the data included in this paper are drawn consisted of thirty-four questions using open-ended response items, closed-ended response items, and Likert scale questions. The instrument was piloted with community college administrators, two peer reviewers, and a panel of experts from the American Association of Community Colleges (AACC). A stratified random sample of 1700 community college administrators across 14 position codes was drawn from the American Association of Community Colleges data bank, providing representation by geographic location, urban and rural locale, and single and multi-campus sites. Letters of introduction and survey packets were mailed, extensive electronic and phone follow-ups were conducted, and a second mailing was distributed yielding a response rate of 54% (n=910) usable surveys. Quantitative variables were analyzed using descriptive statistics. Open-ended responses were content analyzed. An overview of findings is presented first,

with more specific discussions following of technology and its impact on support for learning, administrative processes, and institutional planning.

Our study had several limitations important to note. The study was limited by the position categories used by AACC, who drew our sample. We independently classified positions upon receiving the data set to determine the extent to which our own understandings of position titles corresponded with the groupings used by AACC and found that, while they largely held, there were positions that we would have grouped differently. [AACC groups are developed from institutionally provided data, identifying people/titles in certain position categories.]Our original sample was drawn in December 1999 and a first mailing sent in February 2000. Already, some participants in the sample were no longer in their recorded position. In the course of data collection, which lasted approximately four months from first mailing through two follow-up mailings, many others left their positions. Our ability to increase the respondent pool was limited by turnover in position. As with any survey instrument, one is never sure who completes the questionnaire. We are reporting data presumably provided by the person to whom the survey was sent, but have no way of validating this.

The intention of this paper is to report trends and patterns in the data, rather than to test a hypothesis. Therefore, the data reported here is mainly descriptive in nature.

Administrator Perceptions of Technology Issues

Mission Change and Means of Attainment

Administrators were asked, in open-ended questions, about their institution's current mission, the extent to which the mission had changed over the last 10 years, and in what ways they anticipated it to change in the future.

In addition to stipulating the traditional tripartite mission of community colleges (academic transfer, occupational/vocational education, lifelong learning), administrators spoke to technology use on campus as an important issue and vehicle for accomplishing institutional mission, including but not limited to the classroom. Reflecting back on how mission foci had changed over the last ten years, most administrators indicated an increased use of technology in all aspects of campus life. If technology was not referenced as a facet of mission change during the last ten years specifically, it was included in discussions of change occurring in the ways in which traditional mission and goals were accomplished. Looking into the future, administrators identified several areas of anticipated mission change over the next ten years. As expected, these changes reflect the national rhetoric and administrators' evaluation of their present organizational priorities. Themes in the data included use of technology in instruction and administration, among other non-technology-oriented changes. Modes of instructional delivery were expected to continue to evolve through the use of technology, including distance education and on-line courses, and delivery of content via short courses to meet constituent needs. These forecasted increases in academic service delivery were accompanied by an expectation of increased funding challenges, technology access, and infrastructure support issues related to technology.

Technology Issues Faced by the Colleges

In addition to open-ended questions about mission, we asked respondents to rate a series of issues facing community colleges on a scale from 1-5, with 1 indicating no importance at their institution and 5 indicating very high importance at their institution. Responses provide data on pressing external, internal and technology issues facing respondents' institutions.

Specific to technology issues, administrators were asked about faculty, administrator, and student technological competence; on-line services and recruitment; student access to computers; technology support for instruction and administrative processes; and the use and creation of technologically mediated instructional programs. Overall, administrators agreed that technology and its associated issues were of considerable importance. Administrators, across positions, indicated that technological support for instructional and administrative processes was of utmost importance at their institutions. Although still receiving "high" ratings on the Likert scale, the following items received considerably less attention as important issues across most position categories: technological competence for administrators, on-line student recruitment and on-line services (Table 1).

Insert Table 1

Technology and Support for Learning

The literature is replete with research and commentary on the need for administrators to provide technology support for teaching and learning in the classroom, and issues associated with doing so. Indeed, across administrators in our survey, an overwhelming majority (88%) felt that technology support for instructional and

administrative processes was the technology issue of greatest importance on their campus. Some of the many issues that accompany an increase in faculty use of technology in the classroom include: faculty overload associated with a never ending job as a result of email and 24-7 access expectations of students (Baldwin, 1998; Simpson, 1998); new kinds of professional development needed both for technical expertise in on-line instruction (McLean, 2001) and also for rethinking learning and the faculty role in teaching/learning (Baldwin, 1998); copyright of courses and ideas; and contract release time for course development of on-line courses and for professional development around technology issues. At community colleges, the increased use of part-time faculty can cause additional concerns for department chairs and academic administrators; at recent count, two-thirds of faculty at public community colleges are part-time employees (AACC, 2000). Institutional support services for on-line instruction may or may not be accessible to part-time faculty because of their employment status or the hours they are on campus.

Barriers to the incorporation of instructional technology identified in the literature include insufficient or obsolete hardware and software, inadequate facilities and support services, lack of time and money, an appropriate reward structure, lack of information about good practice, and underestimation of the difficulty in adopting new technologies (Baldwin, 1998; Gilbert, 1996). It is also not clear that on-line learning, as a form of technologically-mediated instruction, is a comfortable and appropriate learning environment for adult learners in spite of the press by O'Banion (1997) and others for continuous access. The growing "digital divide" in and out of the classroom concerns faculty and administrators as they look at ways to appropriately increase the use of

technology without creating a disenfranchised group of learners and employees (de los Santos et al., 2001). Each of these issues and barriers puts demand on the current infrastructure and support mechanisms of the college, requiring careful examination of the institutional policies, processes, and decisions. As Green (1997) suggests, institutional infrastructure is a critical catalyst for innovation and the integration of technology into instruction.

Approximately 22 percent of the administrators we surveyed taught courses during the previous academic year, and many more were instructors or faculty members at some point in their careers. In 1998, Levin viewed faculty as divided into two camps: those who embrace new technologies and see opportunities for innovation versus those who are reluctant to alter their approach to learning for fear of losing what they value. In most instances, non-teaching and teaching administrators in our sample expressed similar opinions about the important technology issues at their institutions. A slightly higher percentage of non-teaching administrators, however, indicated that the creation of new instructional delivery methods and the use of technology in current instructional programs are of very high importance at their institutions. Development of additional technologically-mediated instructional programs to meet constituent needs is also seen as a key change in mission for the next decade by respondents.

Technology Adoption and Administrative Processes

According to Bates (2000), history suggests that the introduction of new technology is usually accompanied by major changes in the organization of work. He explains that new technologies are associated with forms of organizations that have

highly skilled and flexible workers with a good degree of autonomy organized into small and flexible operational units.

Even though most colleges and universities do not fit Bates' characterization, technology has drastically changed the work of administrators across institution type. Enrollment management (registration, billing, financial aid, etc.), parking services, library services, payroll and employment resources are some of the areas transformed through the integration of technology. While less than two-thirds of our survey respondents identified technological competence of administrators as important to their institution, it is clear that technology has permeated non-instructional campus functions. An accompanying growth in personnel associated with technology infrastructure comes, therefore, as no surprise (Green, 2001; Katz & Rudy, 1999). In the same way that positions such as instructional technologists and courseware designers have sprung up in support of teaching and learning, web designers, media specialists, and technicians have become regular administrative lines to support everything from college promotional materials and department web pages to interactive course advising and administrative teleconferencing.

Some researchers have attempted to describe more specifically how technology has impacted work. Landauer (1995), for example makes the distinction between automation and augmentation. Automation involves the use of technology for repetitive tasks and leads to demonstrated gains in productivity and profitability. Augmentation, in comparison, involves the use of technology to assist people in tasks for which machines cannot be completely substituted for humans. Examples of both automation and augmentation are plentiful in higher education.

Another framework that characterizes the progressive use and adoption of technology and is particularly applicable to the changes in higher education is Cross' (2000) three-stage process of Duplication, Application, and Transformation. Duplication involves using technology to replicate what is already being done. New uses of technology are usually not revolutionary, but are merely modified replications of current practices. Cross (2000) describes two major contributions of new technology during the phase of duplication. First, traditional goods or services are more widely available or are available in a new form that can potentially reach new audiences. Secondly, the duplication phase allows first-time users the experience of new technology without totally altering their work or replacing the existing way of accomplishing tasks. An obvious example of duplication is seen in college libraries. Electronic resources originally duplicated existing text or hard-copy material, but these electronic resources have eventually replaced and/or drastically altered how faculty, staff, and students use the library.

The second phase of technology adoption is application. During this phase, there is a re-thinking of the use of technology in light of its new possibilities and an attempt to use technology in ways that allow transformation of tasks. Cross (2000) depicts this phase as messy, difficult, and as a time of breakthrough achievements and glorious failures as people determine what the technology and organizational structure can accommodate. The conversion of traditional classes into on-line courses is a local, department-specific example of the application phase. New methods of interacting with students via email and chat rooms transform the usual tasks that occur in the classroom.

Often the development of new on-line courses cause challenges as the 'usual' policies and practices are questioned and reassessed.

The third phase is transformation, whereby new technologies lead to the transformation of the organization into either an enterprise that does what it did before in a revolutionary new way, or it becomes an entirely new enterprise. Behaviors of individuals are meaningfully reorganized around the possibilities inherent in the technology (Cross, 2000). Seemingly, institutions that develop and maintain successful on-line degree programs, including offering all the needed services on-line, are in the phase of transformation. Students may never actually set foot on a college campus or have face-to-face interaction with college staff, while still receiving a degree from the college – clearly a revolutionary change from previous decades. While none of those responding to our survey worked at institutions that were completely on-line, the spectrum of technological offerings was evident and forecasted to increase.

Implications for Institutional Planning

Given the issues, challenges, and opportunities of technology, the processes of institutional planning and decision-making take on added importance and have significant implications for organizations. Most institutions are involved in some form of on-going long-range or strategic planning process, but few have successfully extended these efforts to include planning for information technology (Lewis, Massey, & Smith, 2001). But as institutional processes continue to modulate around improved technological capabilities, the need for integrated planning, across departments, units, and disciplines, becomes evident. Especially in decentralized systems such as community colleges or large

research universities, innovative practices often occur at the most local or area-specific level. Incorporation of a new on-line service that greatly increases efficiency in one area of the college may unfortunately not be shared with other units or departments that would similarly benefit. Yet, at some point, these changes converge in one college system, in one set of institutional priorities, and in one pool of institutional resources.

Just having an integrated campus-wide plan for the incorporation of technology is not enough to ensure shared vision and accomplishment of institutional goals. Moran (1998) for example, reviewed several campus technology plans and found that they fell into two categories: vision without substance or budget without a vision. He described plans with no substance as vague generalizations that lack clear objectives, strategies, and no assessment or environmental scanning to adequately describe where the college is today. Moran also describes the planning process as painstakingly long with too much time spent defining vision, and a lack of implementation or action plan. Perhaps describing the experience of many planning committee members, the author states, "when you spend two years building a technology plan, three things occur: nobody wants to be involved with implementing the plan, the plan is out of date before you get it distributed, and nobody wants to be on the next planning team" (1998, p.41). A plan that falls in to the 'budget without a vision' category, in comparison, often does not address the problems to be solved, does not define roles or responsibilities, nor does it prioritize aspects of the plan. Rather, this type of plan merely addresses long-range funding issues with little rationale for why the funds are needed. While funding is a critical success factor for any technology plan, funding alone will not suffice. Technology is, by definition, a means to an end, not an end in itself (Bates, 2000). Funding formulas with

no attention to the vision and institutional objectives treat technology as an 'end' rather than a means to achieve the goals and mission of the institution.

When positing alternate administrative processes, Lewis, Massey, and Smith (2001) propose that planning for technology requires careful attention to four areas. The first area is the technology itself, the actual hardware, software, networking, and upgrading capabilities. Although this first area seems rather straightforward, it is complicated by the rapid and non-stop changes that can often make a new system or process outdated before the purchase order is approved. Unfortunately, no technology officer can predict or keep up with technological changes and a better use of time may be to focus on the processes in place to incorporate new technology rather than the technical details.

The second area requiring considerable attention during planning efforts is technical and pedagogical support for faculty, staff, and students. It bears repeating that the top institutional issue reported by community college administrators in our survey was support for instructional and administrative processes. Milliron and Miles (2000) describe the technology "support services crisis" that is ongoing at many institutions. The supply of resources to provide adequate support for faculty, staff, and students is simply inadequate to meet the rising demands and expectations. Thus, this part of the planning process is critical and would pay particular attention to what types of training are and will be available as new technology is incorporated into the organization.

An area related to support and the third area cited by Lewis, et al. (2001) is policies and procedures. This is a deep and invasive facet of technological change that must be addressed in all aspects of the college or university. How does the use of new

technology change institutional policies and procedures related to faculty and administrative workloads, salary and rewards, intellectual property, and user security? Specific units or cross-functional teams may be well suited to answer aspects of this question and to address certain policies or procedures, but the pieces must ultimately come together to form a cohesive process and an understanding of how technology is integrated into organizational functioning.

Lastly, an area of focus during technology planning is the need to align technology with existing institutional goals. Moran (1998) suggests that this can be accomplished by thoroughly assessing the institution's current state of technology usage, followed by a vision of what the institution wants to become. Like any other contextual planning process (Peterson, 2000), after assessing the current state and establishing a vision for the future, the next important question is 'how will we get there?' and includes a sequencing and prioritization of projects, as well as implementation strategies.

Who Plans for Technology?

It is not surprising to learn that the least successful technology plans are those that are marginalized or set apart from overall institutional planning (Lewis, et al., 2001). Bates (2000) sees danger in innovations and new initiatives that are often managed and organized outside the traditional institutional bureaucracy and hierarchies in order to have any chance of success. Institutional leaders play an important role in ensuring that the appropriate units and departments are involved in the planning process and that new innovations are not left on the organizational periphery.

Although it was often the case in the past that functions related to technology were dispersed throughout the organization, according to Luker (2000), the separation of support for one kind of computing from another no longer makes sense from an organizational perspective. The full spectrum of information technology support involves a number of diverse functional areas including administrative computing, academic computing, media services/instructional technology, distance learning, and telecommunications. Lassner (2000) states, "the incredible dynamism and convergence of digital technologies and instructional applications has all but broken the historical basis for separate organizations for different aspects of technology support" (p.38). And many colleges have thus combined administrative and instructional computing within one organizational structure to provide coordination, support, and financial resources more effectively (Villadsen, et al., 2000). Our survey data reveal there is no one organizational chart that best describes where technology experts and support professionals are situated at community colleges. In many instances, the titles of our respondents revealed that technology responsibilities were combined with other administrative duties. Consider the following titles of respondents: Director of Technology and Facilities, Dean for Learning and Information Technology Services, and Director of Institutional Effectiveness and Distance Education. This array suggests a variety of institutional strategies or arrangements related to the placement of technology responsibilities. What is unclear from examining titles or organizational charts, however, is a 'best practice' for coordination of technology functions.

Librarians, as well as other learning resources professionals, may play strong coordinating roles in technology transitions. Lewis, Massey, and Smith (2001) describe

the Center for Teaching and Learning at the University of Indiana that is housed in the library, allowing for active participation from information specialists and copyright experts. The authors explain that adding a technology function to the library's responsibilities can ensure that initiatives assume a high profile and that a high priority is placed on equitable access to information. This perspective assumes that libraries have high institutional visibility, which may or may not be the case at community colleges of different sizes and organizational structures.

At the same time that institutions struggle to coordinate technology processes under one umbrella, Bates (2000) questions whether one person (e.g., the chief information officer) can effectively take responsibility for both academic and administrative technology, especially at larger institutions. Johnson and Carney (2000) echo that sentiment when they explain that often the roots of most technology successes and problems are not within the direct control of the chief technology officer or the technology staff. They state, "the technology staff swims, and sometimes sinks, while towing major technology initiatives through a sea of overall college politics, social and work customs, finances, state and federal policies, organizational structures, and other factors outside the daily operations of the technology department" (p.275). What is crucial for technology transition success is that technology leaders, whether they are faculty, librarians, or IT professionals, have the inclination and ability to understand the culture of the college and to partner with other influential, and possibly non-technologically-oriented faculty and administrators in order to gain continuous support and resources for new initiatives (Johnson & Carney, 2000).

Bates (2000) suggests a structure whereby an associate academic vice president is responsible for academic technology issues, most likely as part of a larger unit for teaching and learning. This associate vice president would then work closely with the head of computing and telecommunications services. Bates (2000) also emphasizes the importance of having a technology advisory board or committee in place that is responsible for setting and coordinating policy and procedures at the institutional level. The 'ideal' advisory board would be made up of faculty members with experience using technology in the classroom, representatives from the teaching and learning center and library, as well as those responsible for the technology infrastructure. Regardless of the specific organizational arrangements, mechanisms need to be in place whereby policies and priorities can be determined and whereby technology concerns are appropriately represented and addressed.

An example of the kind of institutional reform in organizational structure and planning we are advocating is found in Maricopa Community College District's Ocotillo initiative. "Ocotillo reflects an organizational design that involves inclusion, collaboration, shared leadership, timely and relevant planning, and decision making" (de los Santos, Jr. & Story, 2001, p. 54). Ocotillo is the vehicle for cross-functional and cross-campus decision making and problem solving about issues involving learning through technology. After investing significantly in a series of technological innovations within the community college district, senior administrators began asking challenging questions about the impact of these innovations, their limitations and sustainability, the benefits to community members, and who was or should be taking the lead in setting direction. Discovering the answers to these questions led to the inception of Ocotillo in

1987 as a think tank of faculty and administrative committees addressing a full range of issues associated with the infusion of technology into college life.

The question of who controls and participates in establishing the larger policy agenda and infrastructure associated with information and instructional technology is also unclear. This is both an internal and external organizational issue for institutional decision makers. Internally, the question is often driven by classic debates between faculty and administrator priorities. Concerns about "What educational priorities will be compromised to pay the escalating costs of acquiring new computer technology?" (Bromley, p. 51) are felt by all members of the college community when participation in decision making and policy development is not inclusive. Externally, the question is situated within the larger educational policy arena, differentiated by state systems of education (including but often not limited to postsecondary institutions), legislative agendas, and other state agencies (Cintron, Dillon & Boyd, 2001). This is particularly true for public institutions that rely on state funds and funding priorities for many infrastructure upgrades and initiatives, including technology. The potentially daunting costs of continual technological infrastructure improvements cause increased reliance on state funds, in spite of tightening annual legislative allocations, as a means of balancing the increased costs charged to students in the form of user and equipment fees. In a study of community colleges in the Big 12 Athletic conference, Cintron et al. (2001) found that only one state addressed technology infrastructure directly in its higher education policy documents. In Missouri, the postsecondary coordinating board appointed a telecommunications advisory committee with membership representing the higher education institutions in the state to guide the implementation of recommendations and

establish funding priorities for technology. Again, although situations for individual institutions vary from state to state, there is a need for more coordinated policy development when colleges are impacted by changing geographic boundaries for service delivery and by increasing competition for funds from new educational service providers.

Differences in Perception by Administrative Position

Effective planning processes require coordination and input from many areas of an institution, yet it would be naïve to assume everyone sees the issues of technology similarly. The extent to which individual campus units and their administrators use and are directly affected by technology varies; therefore, it would not be surprising to see variation in perspectives shared by administrators in different position categories. Our survey data reveal that administrators in certain positions tend to align with their particular areas within the college in terms of what is of high priority. For example, student services administrators were more likely than those in other administrative positions to indicate student access to computers and on-line services as very important institutional issues. An overwhelming 95 percent of student services administrators also indicated that student technological competence was of high importance at their institution, while only 79 percent of those in other administrative areas (business affairs, institutional research, development, and human resources) indicated student technological competence as being of high importance. In light of their traditional role as student advocates, these results from student services administrators are understandable. Issues of computer and internet access and proficiency are particularly profound for low-income, minority and first-generation students, who have often enrolled in community colleges as

their first postsecondary learning environment (de los Santos, et al., 2001; de los Santos, Jr., 2001). Bridging the potential gap between technological innovation that assumes computer access and competency and the reality of student economic circumstances and prior experience is a significant challenge that needs direct, and continuous, administrative and faculty attention.

The most important issues for chief academic officers, in comparison to other positions, were those related to faculty and the use of technology in the classroom. Over 88 percent of chief academic officers indicated that faculty technological competence was of high importance at their institutions, while over 91 percent indicated that use of technology in current instructional programs was of high importance. The views of chief academic officers were similar, in many cases, to those expressed by Presidents in our study. This is not surprising, given the institution-wide perspective required of chief academic officers and their close structural ties to institutional presidents.

Often those believed to be on the frontline of technological innovation - librarians, information technology administrators, and distance education administrators - were slightly less likely to rate technology issues as being very important at their institutions, as compared to administrators in other areas of the college. For example, 73 percent of librarians indicated that the creation of new delivery systems (e.g., on-line and electronically mediated) was of high importance at their institutions, while close to 90 percent of administrators in business and industry positions, continuing education, and occupation education believed that creation of new delivery systems was of high importance. This difference may reflect the high reliance of business/industry and occupational programs on technology, the need to keep pace with changes and meet the

demands of employers and students, and the increased competition with alternate delivery systems felt by these areas of the college. It may also reflect a greater understanding of the existing technologically mediated systems and their capacity by those most directly involved in their maintenance – the IT staff. Given the limited research on IT staff and their role in larger institutional decision processes, we continue to consider explanations for the views reported by this group of respondents. Table 2 details administrator perspectives on the important technology issues at their institutions.

[Insert table 2]

Conclusion and Policy Implications

Technology is a valuable tool for supporting learning in our postsecondary institutions. According to O'Banion (2000), technology is essential for managing the student flow process, for creating instructional delivery systems, and for linking instructional units, external resources, and campus members. The plethora of conferences, summits, and professional development workshops on the incorporation of technology onto college campuses today, and the constant banter about getting on the "on-line instructional bandwagon" imply that community colleges, as a sector, are well positioned for new forms of instructional delivery and technology support. Despite these discussions, the most pressing issues or challenges are not always clear; for example, even if we agree with the direction or expected outcome of using technology, organizational change processes to support the changes are unclear. What is apparent is that rapid changes as a result of technology demand more systematic approaches to faculty development, staff training, and technological compatability/upgrades, as well as

student support services (in terms of training, administrative processes, and student activities) in order to control costs and provide seamless learning opportunities (Cintron, et al., 2001).

> Major technology transitions are in fact organizational transitions.
>
> On a simple level, technology transitions are all about computers, software, networks, and technology staffing; however, at a more significant level, such transitions are actually more about institutional policies, types of services offered, costs and budgets, collegewide workflow and work behaviors, and outcomes. These transitions are all about changing at least in part of *what* is done in a college, *how* it is done, *when* it is done, *who* does it, *who* pays for it, and *what* the outcomes are. (Johnson & Carney, 2000, p.276)

These transitions and the implementation of strategies related to technology require fundamental change in the way our educational institutions are organized and managed (Bates, 2000). These changes may be perceived as too drastic and too threatening to the core values of many institutions; they will almost certainly be perceived as revolutionary in respect to the professional identities of administrators and faculty. As Green (2001) underscores, the real technology challenge in education involves people, not products.

The human resources aspect of change processes are often overlooked by energetic administrators working to effectively position their institutions in the technology forefront. As with most change processes, the transition issues associated with change are often ignored by leaders (Bridges & Mitchell, 2000) and yet are key to successful adoption of innovation. How administrators, faculty and students understand

and adjust to the changes are directly related to the rapidity with which changes are institutionally accepted by administrators, faculty, and students, and the extent to which they can be sustained. Transition issues encompass a wide array of factors including faculty willingness to include instructional technology in their classes, institutional researchers' and planners' ability to abandon traditional planning and budgeting models, and senior administrators recognizing that technology requires inclusivity across units in ways heretofore, perhaps, unpracticed in decision making and policy development. Administrative issues that develop as a result of technology range from the more tangible hardware needs to the more philosophic campus mission statements to the more affective identity and efficacy of campus professionals.

Technology transitions are transitions of processes, tasks, policies, culture, and people, thus it is essential to garner widespread involvement and substantive participation from knowledgeable individuals in many functional areas of the organization (Johnson & Carney, 2000). The extent to which colleges actually succeed in these initiatives is affected by the larger organizational context, multiple missions and priorities, funding issues, and instructional and administrative readiness among other factors. Yet, it is clear that institutions choosing the path of technology change need to do so in a culture of campus-wide involvement, shared vision for technology, collaboration and coordination internally and externally, in which administrators play central leadership roles. Our data show some different administrative perspectives among those who might, on a given campus, be part of institution-wide planning and decision making. Yet many questions remain and more (and different kinds of) data analyses need to be done. It is important to better understand some of the important challenges facing decision makers related to

technology and its usage. We need to look more closely at the impact of technology policy decisions on student access, learning outcomes, faculty reward systems, faculty and staff training and development, and financial aid and tuition policies. New planning, decision making and infrastructure organizational models may be necessary to support technology usage as it continues to evolve, seeming to belie more traditional, consistent and sometimes lethargic administrative processes and models. And, if we believe change theories, administrative perspectives on these issues may vary, so getting data from multiple constituents is key to understanding the variation in order to create and institutionalize technological innovations on our college campuses.

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TABLE 1: Administrator Perspectives on Technology Issues

Technology Issues	**Percentage of administrators rating this issue as important or very important at their institutions**
Technology support for instructional and administrative processes	88.0%
Student access to computers	84.4%
Use of technology in current instructional programs	84.2%
Technological competence of students	81.9%
Technological competence of faculty	81.6%
Creation of new technologically mediated instructional programs	79.1%
On-line student services	72.1%
On-line student recruitment/marketing	67.6%
Technological competence for administrators	64.0%

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Table 2: Views on Technology Issues by Position/Area:
Percentage of administrators rating items as high in importance (4-5 on Likert scale) at their institutions

Technology Issue	Presidents	Chief Academic Officers	Student Services Officer	Administrative (Business and Financial Affairs, HR, Development, and Institutional Research)	Occupational Education and Continuing Education	Distance Education and Information Technology	Librarians and Learning Resources
Technology support for instructional and administrative processes	92.3	92.9	86.0	90.2	90.6	88.9	77.8
Student access to computers	86.5	81.0	92.9	86.3	82.8	79.6	84.4
Use of technology in current instructional programs	88.7	90.9	83.7	84.8	85.9	79.6	75.0
Technological competence of students	90.6	84.0	95.3	79.3	82.2	77.8	84.1
Technological competence of faculty	88.7	88.0	88.4	75.0	85.8	85.2	75.6
Creation of new technologically mediated instructional programs	84.6	87.8	88.1	84.8	89.2	86.8	73.3
On-line student services	79.2	78.8	83.7	72.9	70.5	75.5	60.0
On-line student recruitment/marketing	81.1	75.8	72.1	68.9	66.4	61.1	50.0
Technological competence of administrators	73.6	70.0	76.7	58.2	67.7	57.4	51.1

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